

PATENT ABSTRACTS OF JAPAN

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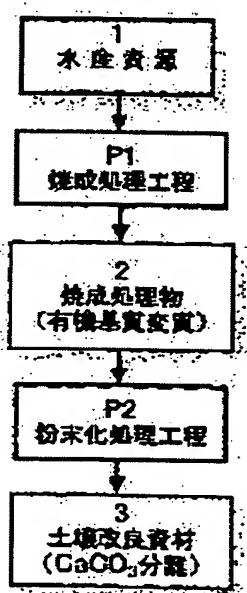
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(21)Application number : 2003-093619 (71)Applicant : KUDO TOSHIAKI

(22)Date of filing : 31.03.2003 (72)Inventor : KUDO TOSHIAKI

(54) MARINE RESOURCE-USING SOIL CONDITIONER AND METHOD FOR PRODUCING THE SAME



(57)Abstract:

PROBLEM TO BE SOLVED: To provide a soil conditioner which has a fast-acting property, does not damage the roots of plants, and enables the sowing of seeds from the day when the soil conditioner is scattered.

SOLUTION: The method for producing the marine resource-using soil conditioner 3 comprises a calcination treatment process P1 for calcining a marine resource 1 containing calcium carbonate and organic substrates surrounding the calcium carbonate as main constituents in calcination conditions for changing the organic substrates into such an extent as enabling the separation of the calcium carbonate from the organic substrates and a pulverization treatment process P2 for separating the calcium carbonate from the calcinations treatment product obtained in the calcination treatment process P1.

DETAILED DESCRIPTION

[0001]

[Field of the Invention]

This invention relates to a marine-resources use soil conditioner and its manufacture approach, and relates to the quick-acting marine-resources use soil conditioner which can use for altitude a part for the calcium carbonate especially contained in a shell, and its manufacture approach.

[0002]

[Description of the Prior Art]

Current and calcium-carbonate materials are produced in large quantities from the limestone which is mineral resources, and establishment of the disintegration approach and directions, and functional analysis and research are made early, and they are spread and used for social life at large widely as the materials for agriculture, or industrial use materials. On the other hand, a principal component is a calcium carbonate, and the shell which is a biomass contains a calcium carbonate in high concentration compared with the limestone which has established use, moreover has the advantage that there are few impurities, and has the point of having excelled the limestone which is a current main resource. For this reason, although separation and manufacture of the calcium carbonate (henceforth a "shell calcium carbonate") from a shell are made from the former, by direct-impalpable-powderization-processing this in the state of a raw shell, manufacture is made and the shell impalpable powder manufactured by this processing is usually used as the materials for agriculture, and materials for acid soil amelioration which have loose effect of fertilizer especially.

[0003]

Although it is the approach by which acid soil amelioration with a shell is performed from the former, the approach which added amelioration further in recent years is proposed by patent application etc. among those, with "the lime materials for former **" indicated by JP 2000-26182 A by making it easy to melt, the calcium component of agricultural lime materials which cannot melt easily It aims at enabling it to compensate a calcium component with the agricultural lime materials used in large quantities conventionally by little use. The agricultural lime materials originating in a shell etc. are used as a principal component, and the lime materials calcined-lime-sized in soil are proposed by the configuration which comes to blend edible organic acids, such as a citric acid, with it (patent reference 1).

[0004]

Moreover, it was indicated by JP 2002-125582 A "-- the approach of writing and writing with processing approach", such as husks, for the purpose of writing for considering as fertilizer or a soil conditioner, and performing processing of chaffs easily and improving a result, decompressing chaffs to atmospheric pressure over 5 seconds or more in a humidification ambient atmosphere or a desiccation ambient atmosphere, after carrying out predetermined-time pressurization at the temperature of 120-150 degrees C at two or more atmospheric pressures, and pulverizing after that has proposed. According to it,

it writes by pressurization and heat-treatment, chaffs become soft, and it can grind easily, and powder does not have a sharp angle, and even if a result is good and faces handling, it supposes that it is safe (patent reference 2).

[0005]

While a calcium carbonate is included in abundance as mentioned above, there are calcined lime (CaO) and slaked lime (CaOH₂) with strong alkalinity, the calcium carbonate (CaCO₃) and magnesia lime (Mg is included.) whose alkalinity is not so strong, and a powdered shell with which the use is not fully made in the lime materials for acid soil amelioration. The above-mentioned patent reference 1 can be said for the high elution technique in calcined-limeizing of a powdered shell and the patent reference 2 to be the grinding easy-sized techniques of a powdered shell.

[0006]

[Patent reference 1]

JP 2000-26182 A "the lime materials for former **." A claim, claims 1-3. A detailed description, paragraphs 0004-0009 (gestalt of implementation of Object of the Invention - invention), paragraphs 0014-0021 (an example, Tables 1-3).

[Patent reference 2]

JP 2002-125582 A -- "writing -- processing approach", such as husks. A claim, claims 1-3. A detailed description, paragraphs 0003-0009 (gestalt of implementation of Object of the Invention - invention).

[0007]

[Problem(s) to be Solved by the Invention]

now, the description to which the limestone calcium-carbonate materials used as a current soil conditioner do not affect a vegetable root -- **** -- although it is, it is said that time amount progress of the 40th day or more is needed for carrying out a mutual decomposition reaction to the organic substance in soil, and soil amelioration being realized. Therefore, although there is almost no danger of the failure by lime, there is a fault that the soil amelioration effectiveness is loose. In the case of the calcium hydroxide (slaked lime) currently daily used for the soil amelioration of aviculture on the other hand, since alkalinity is strong, there is little irrelevance and it ends, but after sprinkling for the strong-base nature, there is a fault that the field activity of sowing, seedling transplantation, etc. cannot be performed depending on the case, also over two - three weeks for one week.

[0008]

For the field of the cold district where the annual field number of workable days is restricted by the snow coverage and low temperature during winter, or the cool altitudes, shortening these days as much as possible by acid soil amelioration achievement from this lime spraying is called for like a northeast and Hokkaido including Aomori Prefecture. For that purpose, offer of the technique instead of approach called the high elution technique and grinding easy-sized technique in calcined-lime-izing of a powdered shell which was stated with the conventional technique in which the problem

of a failure over a vegetable root brings the soil amelioration effectiveness forward using few calcium carbonates is effective. As above-mentioned, since more calcium carbonates than a limestone contain, there should just be a technique which makes a shell calcium carbonate the early lime materials of the soil effectiveness in a shell.

[0009]

However, the shell calcium carbonate exists by the shape of an ultrafine particle in the shell organic substrate which is one of the qualities of a constituent of a shell, and the magnitude is several hundreds of nm - micrometer level about. Therefore, in the case of the conventional powdered shell materials manufactured by raw shell disintegration processing with the application of the same approach as a limestone, almost all calcium carbonates are in a condition [being shut up into the shell organic substrate of difficulty resolvability and difficulty solubility], and soil spraying will be made with this condition. A shell organic substrate is [that a small amount of calcium carbonate which jumped out of the structure of a shell organic substrate by chance by the impalpable powdered processing process can only act soil amelioration, and] in order to hardly carry out the dissolution and decomposition in soil. This is a fundamental factor with low activity and evaluation as a soil conditioner for agriculture of a shell (powdered shell), and it is the big cause by which the use does not progress. That is, the quick-acting soil conditioner by shell calcium carbonate which brings about expansion of a field number of workable days depending on the conventional approach cannot be obtained.

[0010]

The technical problem of this invention is conquering the fault of this conventional technique and offering acid soil amelioration materials slack, a quick-acting marine-resources use soil conditioner, and its quick-acting manufacture approach using marine resources, such as a shell. It is that the technical problem of this invention furthermore offers the manufacture approach of a marine-resources use soil conditioner that a shell calcium carbonate can be used for altitude at eye others. Moreover, it is offering a marine-resources use soil conditioner whose seeding's there is no failure to the root of a plant body etc., and becomes possible even from sprinkled that day.

[0011]

[Means for Solving the Problem]

The invention-in-this-application person took lessons from the above-mentioned technical problem, inquired wholeheartedly, and resulted in the solution means. That is, the invention by which a patent claim is carried out by this application is as follows as above-mentioned The means for solving a technical problem.

(1) The marine resources which contain a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent baking down stream processing calcinated on the baking conditions which bring deterioration of an organic substrate to extent which enables separation from the organic substrate of a calcium carbonate by passing through disintegration down stream processing for separating the calcium carbonate in the baking processing object obtained by this baking down stream processing. The manufacture approach of a marine-resources use soil conditioner that

the marine-resources use soil conditioner which exists where a calcium carbonate is separated from an organic substrate can be obtained.

[0012]

(2) The manufacture approach of a marine-resources use soil conditioner given in (1) to which said marine resources are characterized by being the shell of shellfish, such as a scallop, an oyster, and a freshwater clam.

[0013]

(3) (1) which said baking down stream processing is performed on the baking conditions which can carbonize said organic substrate, and is characterized by the ability to obtain the baking processing object which considers non-decomposed a calcium carbonate and the carbonized organic substrate as a presentation according to this process, or the manufacture approach of a marine-resources use soil conditioner given in (2).

[0014]

(4) The manufacture approach of a marine-resources use soil conditioner given in (3) to which said baking conditions come out 25 or less minutes 3 minutes or more, and are characterized by a certain thing the burning temperature of 740 degrees C or less of 560 degrees C or more, and firing time.

[0015]

(5) The manufacture approach of a marine-resources use soil conditioner given in (3) to which said baking conditions come out 20 or less minutes 5 minutes or more, and are characterized by a certain thing the burning temperature of 700 degrees C or less of 600 degrees C or more, and firing time.

[0016]

(6) (1) which said baking down stream processing is performed on the baking conditions which can ash said organic substrate, and is characterized by the ability to obtain the baking processing object which considers non-decomposed a calcium carbonate and the ashed organic substrate as a presentation according to this process, or the manufacture approach of a marine-resources use soil conditioner given in (2).

[0017]

(7) The manufacture approach of a marine-resources use soil conditioner given in (6) to which said baking conditions come out 45 or less minutes 25 minutes or more, and are characterized by a certain thing the burning temperature of 900 degrees C or less of 720 degrees C or more, and firing time.

[0018]

(8) The manufacture approach of a marine-resources use soil conditioner given in (6) to which said baking conditions come out 45 or less minutes 25 minutes or more, and are characterized by a certain thing the burning temperature of 850 degrees C or less of 750 degrees C or more, and firing time.

[0019]

(9) The manufacture approach of a marine-resources use soil conditioner given in (6) to which said baking conditions come out 45 or less minutes 25 minutes or more, and are characterized by a certain thing the burning temperature of 830 degrees C or less of 770 degrees C or more, and firing time.

[0020]

(10) The manufacture approach of a marine-resources use soil conditioner given in either [which is characterized by being a thing using the fuel and firing furnace with which said baking conditions can disassemble the calcium oxide generated in said baking down stream processing] (6) thru/or (9).

[0021]

(11) The manufacture approach of a marine-resources use soil conditioner given in (10) characterized by for said fuel being natural gas and said firing furnace being a radiant heat mold firing furnace.

[0022]

(12) Said disintegration down stream processing is the manufacture approach of a marine-resources use soil conditioner given in either [which is characterized by being the process which carries out crushing processing of said baking processing object mechanically, and lets the wire sieve of 60 meshes (250 micrometers) thru/or 80 meshes (177 micrometers) pass for the obtained crushing processing object] (1) thru/or (11).

[0023]

(13) The marine-resources use soil conditioner characterized by for the calcium-carbonate content obtained by using as a raw material the shell of shellfish, such as the scallop and oyster which contain a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent, and a freshwater clam, and carrying out baking processing of this being 98% of the weight or more, and alkalinity being 60% or less 50% or more.

[0024]

(14) The marine-resources use soil conditioner which is obtained by either (2) thru/or (12) using the manufacture approach of a publication, and is characterized by for a calcium-carbonate content being 98% or more, and alkalinity being 60% or less 50% or more.

[0025]

(15) The marine-resources use soil conditioner which is a marine-resources use soil conditioner which contains a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent, and which is obtained by using the shell of shellfish, such as a scallop, an oyster, and a freshwater clam, as a raw material, and carrying out baking processing of this, and is characterized by a particle with a particle size of 250 micrometers or less occupying 100 or less% of the weight of the whole 90% of the weight or more.

[0026]

(16) The marine-resources use soil conditioner which is obtained by either (2) thru/or (12) using the manufacture approach of a publication, and is characterized by a particle with a particle size of 250 micrometers or less occupying 100 or less% of the weight of the whole 90% of the weight or more.

[0027]

That is, this application also offers the acid soil amelioration materials which the technique in which this can be used for altitude is conventionally offered and combined paying attention to the ability to have not used this enough though the calcium carbonate which is the lime materials which do not do a failure to a vegetable root as an object for acid soil amelioration is contained in a marine-resources slack shell at high concentration, there is no risk of a failure for a vegetable root, and have quick action, and its manufacturing technology.

[0028]

This application offers the new and useful soil conditioner based on notably different advantageous function and engine performance, and, as for the calcium carbonate of the conventional limestone origin demonstrated by the ultrafine particle nature of a shell calcium carbonate, clarifies the method of using / utilizing and convenience again.

[0029]

Although especially a shell is taken up and explained in this application as marine resources used as the raw material of the marine-resources use soil conditioner of this invention, this invention carries out considerable-amount content of the calcium carbonate rather than is limited to this, and if it is the well-known resource which can apply the manufacturing method of this invention, it corresponds to the marine resources which are the raw materials altogether applied to this invention. For example, the bone of sea urchin husks and a fish etc. corresponds, and all of a scallop, an oyster, a freshwater clam, and other shellfishes correspond with a shellfish. Moreover, since this invention marine-resources use soil conditioner has a function as a calcium-

carbonate agent for acid soil amelioration, the word of a "soil conditioner" is suitably used for it in explanation.

[0030]

The calcium carbonate which composes the shell (the thing of the matter constituted considering the calcium carbonate as a component is said.) The following is also suitably used by this mind. It is wrapped in by difficulty decomposition and the difficulty soluble and hard shell organic substrate. This shell organic substrate is used as a wall, and the next calcium carbonate exists. The ultrafine particle-like calcium carbonate is exactly hidden by the parts of a shell organic substrate and the opening of a block by the part of the concrete of a concrete block. Degeneration reactions [as opposed to heating burning temperature in these two quality of a shell constituent "a calcium carbonate" and "shell organic substrates"] completely differ. It will decompose, if 900 degrees C is exceeded, and a carbon dioxide escapes from a calcium carbonate, and it is known that a calcium oxide will generate. On the other hand, if carbonization starts at 560 degrees C and a shell organic substrate exceeds 700 degrees C, ashing will start gradually. the difference in a degeneration reaction to such a burning temperature -- paying one's attention -- a shell organic substrate -- carbonization or ashing -- it changes into the condition in which separation with a shell organic substrate and a calcium carbonate is possible by carrying out baking processing. moreover, a shell organic substrate -- carbonization and ashing -- in order to wear elasticity nature by passing through baking processing, impalpable powder-sized processing of a separation extract becomes still easier.

[0031]

Impalpable powdered processing of a baking shell is performed mechanically and a separation extract with a calcium carbonate and a shell organic substrate is realized. especially -- a shell organic substrate -- all -- baking -- ashing -- the hard nature deteriorates completely by processing, and even if it does not process special, there is a property which advances to impalpable powderization under natural environment. As for the powder granular level of a shell, it is desirable to consider as the level which let the network sieve of 60 meshes (250 micrometers) - 80 meshes (177 micrometers) pass in consideration of reservation of the quick nature of the soil amelioration effectiveness in a field and the practicality as materials for agriculture in spraying.

[0032]

as mentioned above, the description to which the limestone calcium-carbonate materials mainly used as a soil conditioner do not affect a vegetable root -- **** -- although it is, time amount progress of the 40th day or more needs the soil amelioration effectiveness to be obtained, and when it is a calcium hydroxide (slaked lime), the field activity of period sowing beyond one week or it, seedling transplantation, etc. cannot be performed after spraying. however, this invention -- a shell organic substrate -- carbonization or ashing -- since quick-acting soil amelioration is possible without the effect on a vegetable root for the processed shell calcium carbonate, a long-term ariculture idle period does not generate it like before.

[0033]

The mutual decomposition reaction of the shell calcium carbonate (henceforth a "ultrafine particle-like shell calcium carbonate") and the organic substance which came ultrafine particle-like after spraying and into soil advances promptly, and it is considered to be because for soil amelioration to be realized promptly, without doing damage to a vegetable root that the advantageous effectiveness of such this invention is acquired. Therefore, since it originally has the special feature which the soil amelioration effectiveness already shows up greatly in soil at the next day which carried out spraying mixing, and does not hurt its vegetable root, agricultural works, such as sowing and seedling transplantation, can be performed. Thus, since the arviculture activity limit after spraying does not generate a shell calcium carbonate, expansion of field use days is secured and the arviculture activity period extension effectiveness is a very large soil conditioner for the field of a cold district or the cool altitudes.

[0034]

[Embodiment of the Invention]

Hereafter, a drawing explains this invention to a detail.

Drawing 1 is the flow Fig. showing the configuration of the manufacture approach of the marine-resources use soil conditioner concerning this invention. The marine resources 1 with which this manufacture approach contains a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent in drawing The baking down stream processing P1 which calcinates on the baking conditions which bring deterioration of an organic substrate to extent which enables separation from the organic substrate of a calcium carbonate, and obtains the baking processing object 2, The disintegration down stream processing P2 for separating the calcium carbonate in the baking processing object 2 obtained by this baking down stream processing P1, since – it is constituted and the marine-resources use soil conditioner 3 which finally exists where a calcium carbonate is separated from an organic substrate can be obtained by passing through each process (claim 1). As an example of the marine resources which this manufacture approach makes a processing object (raw material), the shell of shellfish, such as a scallop, an oyster, and a freshwater clam, is mentioned (claim 2).

[0035]

[Function]

Since this manufacture approach is constituted as mentioned above in drawing 1, the marine resources 1 which contain a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent The baking processing object 2 which deterioration of extent which baking processing on conditions is made suitably and enables separation from the organic substrate of a calcium carbonate in the baking down stream processing P1 produced is obtained, and, subsequently to the disintegration down stream processing P2, it sets. Disintegration processing is made, separation of an inner calcium carbonate is performed, and, as for the baking processing object 2 obtained by this baking down stream processing P1, the marine-resources use soil conditioner 3 with which a calcium carbonate finally exists in the

condition of having dissociated from the organic substrate is obtained.

[0036]

Drawing 2 is the manufacture approach of the marine-resources use soil conditioner concerning this invention, and is the flow Fig. showing a configuration including a carbonization process. In drawing, this manufacture approach is a configuration which makes said baking down stream processing (P1 of drawing 1) the carbonization down stream processing P31 performed on the baking conditions which can carbonize said organic substrate in the flow shown in drawing 1. According to this process P31, the baking processing object 32 which considers non-decomposed a calcium carbonate and the carbonized organic substrate as a presentation can be obtained, and the marine-resources use soil conditioner 3 which finally exists where a calcium carbonate is separated from an organic substrate is obtained. (Claim 3).

[0037]

In drawing, said baking conditions can be more desirably made into less than [more than firing time 5 minute 20 minute] (claim 5) 25 or less (claim 4) minutes 3 minutes or more firing time with 600-degree-C or more burning temperature of 700 degrees C or less with 560-degree-C or more burning temperature of 740 degrees C or less. A shell organic substrate for this conditioning to separate the wrapped-in calcium carbonate can be carbonized.

[0038]

The carbonization down stream processing P31 is explained more to a detail. The qualities of a constituent of a shell are a "calcium carbonate" and a "shell organic substrate." It is said for the content of the calcium carbonate of a shell 90 to 92% that a shell organic substrate is 10% or less. At this process P31, in order to make easy to carry out the separation extract of the minute calcium carbonate wrapped in by the shell organic substrate, carbonization baking of the shell organic substrate is carried out. Carbonization burning temperature is more desirably heat-treated 25 or less minutes 3 minutes or more 20 or less minutes 5 minutes or more firing time firing time with 600-degree-C or more burning temperature of 700 degrees C or less with 560-degree-C or more burning temperature of 740 degrees C or less. If it heats above 900 degrees C, a carbon dioxide (CO₂) will dissociate, and a calcium carbonate is a calcium oxide. (CaO calcined lime) It will generate. Therefore, under the above-mentioned temperature conditions, generation of a calcium oxide is controlled and most shell calcium carbonates are held. And the degree of hardness of the shell organic substrate which made crushing difficult falls sharply by this carbonization down stream processing P31. The grinding and powder processing become still easier, and the carbonization part of the shell organic substrate completely tintured with flexibility can make easy the separation extract of the calcium carbonate in the disintegration down stream processing P32 which is a back process.

[0039]

Drawing 3 is the manufacture approach of the marine-resources use soil conditioner concerning this invention, and is the flow Fig. showing the configuration containing an

ashes chemically-modified degree. ashing performed in said baking down stream processing (P1 of drawing 1) on the baking conditions which can ash said organic substrate in the flow which showed this manufacture approach to drawing 1 in drawing - - it is the configuration made into down stream processing P61. According to this process P61, the baking processing object 62 which considers non-decomposed a calcium carbonate and the ashed organic substrate as a presentation can be obtained, and the marine-resources use soil conditioner 63 which finally exists where a calcium carbonate is separated from an organic substrate is obtained. (Claim 6).

[0040]

In drawing, said baking conditions can be more desirably made into less than [more than firing time 25 minute 45 minute] (claim 9) 45 or less (claim 7) minutes 25 minutes or more 45 or less (claim 8) minutes 25 minutes or more firing time firing time at 770-degree-C or more burning temperature of 830 degrees C or less with 750-degree-C or more burning temperature of 850 degrees C or less with 720-degree-C or more burning temperature of 900 degrees C or less. A shell organic substrate for this conditioning to separate the wrapped-in calcium carbonate can be ashed.

[0041]

Ashing -- down stream processing P61 is explained more to a detail. Ashing in the condition of having raised burning temperature for the shell organic substrate from the carbonization baking condition further in this process P61 in order to enlarge more certain more the separation condition of the quality of a shell constituent "a calcium carbonate", and a "shell organic substrate" -- a condition is deteriorated. The ashed shell organic substrate will be in the condition that hard nature deteriorated completely. ashing -- even if a shell does not process special, it is crushed under the natural environment outside a firing furnace, and has the special feature which advances to impalpable powderization soon.

[0042]

In order to hold a calcium-carbonate condition and to make a shell organic substrate ash, burning temperature maintains 800-degree-C order in general, and calcinates it for 30 - 35 minutes. in this case, ashing -- level is 98% or more. However, a carbon dioxide (CO₂) may fall out from some particle calcium carbonates, and a calcium oxide (CaO) may generate. in order to avoid this -- ashing of this invention -- in down stream processing P61, it is desirable to use the radiant heat mold firing furnace which uses a natural gas fuel (claims 10 and 11). This firing furnace is equipped with the description to which combustion flame does not hit a direct shell. Moreover, in the combustion reaction of natural gas, heat energy, a carbon dioxide (CO₂), and a steam (H₂O) are generated by the reaction with the oxygen in air. The maximum activity of such natural gas combustion characteristics and the features of a radiant heat mold firing furnace is carried out.

[0043]

That is, with a radiant heat mold firing furnace, as heating energy in a furnace, heat energy carries out the recombination reaction of the generation steam to the calcium

oxide generated in the firing furnace in this process P61, and converts a calcium oxide (CaO) into a calcium hydroxide (CaOH₂). Thus, ashing of a shell organic substrate -- by processing with the radiant heat mold firing furnace of natural gas fuel use, decomposition removal of the calcium-oxide component generated by the heating processing process can be carried out by the chemical reaction using combustion characteristics.

[0044]

Since structure has deteriorated, even if the ashed shell organic substrate does not process special, it is impalpable-powderized with time amount progress under natural environment, and in the disintegration down stream processing P62 which is a back process, the separation extract of a calcium carbonate and a shell organic substrate is obtained simply certainly. In addition, the amount of generation of the calcium hydroxide which the calcium oxide which is a by-product by heating at high temperature comes to convert -- a shell organic substrate -- almost -- perfect -- ashing -- when processed, it is 16 - 18% of the weight.

[0045]

Each disintegration down stream processing P2, P32, and P62 can carry out crushing processing of said baking processing object mechanically, and can make the obtained crushing processing object the process which lets the wire sieve of 60 meshes (250 micrometers) thru/or 80 meshes (177 micrometers) pass in drawing 1, and 2 and 3 (claim 12).

[0046]

The disintegration down stream processing P2, P32, and P62 is explained more to a detail. When it passes through the carbonization down stream processing P31 of drawing 2 , in order to take out a particle-like calcium carbonate certainly out of a shell organic substrate, the shell which carried out carbonization processing performs mechanical disintegration processing. If a shell organic substrate is carbonized, the difficulty friability will be solved and it will become easy to impalpable powder-ized process the shell which wore elasticity nature. Impalpable powder lets the wire sieve of 60 meshes (250 micrometers) - 80 meshes (177 micrometers) pass. On the particle-like level obtained by this, the shell calcium carbonate is in the condition of having exposed to the front face enough, and a soil amelioration function is fully demonstrated. And even if it is the field which is easy to be influenced of a wind, spraying is possible with the same practicality as usual.

[0047]

The case where it passes through the carbonization down stream processing P61 of drawing 3 -- a shell organic substrate -- perfect -- ashing -- it is processed and the hard nature of a shell is lost. Under the natural environment of the exterior of a firing furnace, even if the shell organic substrate in which structure deteriorated does not process special, a crack produces it automatically in a shell first. If decomposition of the structure of a breadth shell progresses to the whole and this passes also for disintegration and about one month soon, disintegration will advance even to extent

which passes along the wire sieve whose amount [95% of] order of whole is 60 meshes. However, it is more desirable to carry out mechanical disintegration processing, in order to ensure the separation extract of a calcium carbonate. At this process P61 as well as P31 of drawing 2, impalpable powder lets the wire sieve of 60 meshes (250 micrometers) - 80 meshes (177 micrometers) pass. The same handling as the impalpable powder calcium carbonate which carried out carbonization processing is possible for the time of spraying in a field. It is equivalent to the materials of carbonization processing also in a soil amelioration functional side, and irrelevance can be stopped few.

[0048]

By passing through the manufacture approach of this invention explained above, the marine-resources use soil conditioner which has the description whose calcium-carbonate content is 98% of the weight or more, and whose alkalinity is 60 or less% of the weight 50% of the weight or more can be obtained by using the shell of shellfish, such as a scallop, an oyster, and a freshwater clam, as a raw material (claims 13 and 14). Moreover, similarly a particle with a particle size of 250 micrometers or less can obtain the marine-resources use soil conditioner which has the description which is 100 or less % of the weight of the whole 90% of the weight or more by using the shell of shellfish, such as a scallop, an oyster, and a freshwater clam, as a raw material (claims 15 and 16).

[0049]

A shell organic substrate -- carbonization or ashing -- the same handling is possible for both the calcium carbonates processed and obtained. Also itself, the shell calcium carbonate of an ultrafine particle begins decomposition by prompt mutual disintegration with the organic substance in soil after field spraying. The soil amelioration by disassembly of a calcium carbonate carries out synchronization to the soil enrichment by organic substance decomposition. This quick action is the greatest description of the ultrafine particle calcium carbonate which a biomass slack shell has.

[0050]

Moreover, it is known that a calcium carbonate has the features which do not hurt their vegetable root. It is because there is neither not being accompanied by generation of heat in soil like calcined lime (CaO) nor a rapid ion-exchange operation like slaked lime (CaOH₂). Carbonization or ashing -- the processed shell calcium carbonate can perform sowing and seedling transplantation within the day which carried out field spraying. This is the greatest advantage which the ultrafine particle shell calcium carbonate which is the marine-resources use soil conditioner of this invention has.

[0051]

It is specified that the calcium-carbonate official specification produced from a limestone is opened to traffic in a 1.7mm network sieve, and it passes a 600 micrometers (30 meshes) network sieve 85% or more. This calcium carbonate -- soil spraying -- carrying out -- 40 days or more -- soil amelioration is obtained after carrying out time amount progress. Compared with a shell calcium-carbonate particle, it has thing magnitude

about 1000 or so times. In the limestone calcium carbonate by official specification, even if it is several months after carrying out soil spraying, the particle which remained into soil, without being decomposed may be inspected visually. However, the shell calcium carbonate concerning the marine-resources use soil conditioner of this invention is the ultrafine particle of 1/1000 size of the above-mentioned official specification, and can reduce notably the unused condition of starting, especially – ashing – this invention manufacture approach of passing through processing has the high effectiveness of extracting a particle calcium carbonate.

[0052]

Carbonization or ashing – the processed shell calcium-carbonate impalpable powder does not give constraint to arviculture agricultural work. Although the Hataji cultivation period is limited by the seasonal factor of winter in cold districts and the cool altitudes, such as a northeast and Hokkaido, cultivation period expansion and the arable-land activity period extension effectiveness can be brought about for such an area.

[0053]

[Example]

It cannot be overemphasized that the marine-resources use soil conditioner and its manufacture approach of this invention are not hereafter limited to these although the example of this invention is described.

< example 1 Shell's carbonization processing >

In order to carry out the separation extract of the minute calcium carbonate wrapped in by the shell organic substrate, the carbonization baking processing trial was performed for the shell organic substrate. In order that a super kiln PSK mold (the Japan kiln incorporated company make) and carbonization burning temperature might prevent a scallop shell as for the used shell and a firing furnace might prevent calcium-oxide generation, it considered as for [20 minutes] 5 minutes at 600 degrees C - 700 degrees C (if a calcium carbonate (CaCO₃) is heated above 900 degrees C, it is known that a carbon dioxide (CO₂) will dissociate and a calcium oxide (CaO) will generate.). The trial results of the obtained baking processing object are as follows.

Calcium carbonate 98.43%

Alkalinity 54.42%

pH 10.2 (assay engine Japan **** assay association)

[0054]

The qualities of a constituent of a shell are a "calcium carbonate" and a "shell organic substrate." It is said for the content of the calcium carbonate of a shell 90 to 92% that a shell organic substrate is 10% or less. Therefore, it was shown by the carbonization processing concerning this invention that the shell calcium carbonate is held mostly. And the degree of hardness of the shell organic substrate which made crushing difficult by this carbonization processing falls sharply. The carbonization part of the shell organic substrate completely tintured with flexibility was in grinding and a condition with still easier powder processing, and the separation extract of a calcium carbonate was in the sufficiently possible condition.

[0055]

< Example 2 ashing of a shell -- processing >

Ashing which raised burning temperature for the shell organic substrate from the carbonization baking condition further in order are more large and to ensure the separation condition of a "calcium carbonate" and a "shell organic substrate" which is the quality of a shell constituent -- ashing deteriorated to a condition -- the processing trial was performed. what has a scallop shell and a firing furnace the same as that of an example 1, and ashing -- in order that baking conditions might hold a calcium carbonate and might make a shell organic substrate ash, they maintained 800-degree-C order and set it as for 30 - 35 minutes. Moreover, in order to convert into a calcium hydroxide (calcium2 (OH)) the calcium oxide (CaO) generated in part according to an elevated temperature, the natural gas fuel was used and it carried out by baking of a radiant heat mold. The trial results of the obtained baking processing object are as follows. Calcium carbonate 73.91%

Alkalinity 61.03%

pH 12.1 (assay engine Japan **** assay association)

[0056]

Ashing -- level was 98% or more. hard nature spoils the ashed shell organic Substrate completely -- having -- structure -- deteriorating -- **** -- ashing -- the shell was in the condition which crushes automatically under the natural environment outside a firing furnace, and advances to impalpable powderization soon. Therefore, the separation extract of a calcium carbonate and a shell organic substrate was in the easy condition acquired certainly. moreover, the amount of calcium-hydroxide generation -- a shell organic substrate -- almost -- perfect -- ashing -- when processed, it was 16 - 18% of the weight.

[0057]

Observation of the shell deterioration situation in each baking processing trial of the above carbonization and ashing and evaluation of friability are summarized in Table 1.

[0058]

[Table 1]

[0059]

< Example 3 Soil amelioration performance test [of a soil conditioner with a carbonization processing shell] >

The acid soil amelioration effectiveness of a soil conditioner (henceforth a "carbonization shell calcium carbonate") with a carbonization processing shell was examined. The experimental specification is as follows. Hereafter, the shell of a raw material is a scallop as long as there is no notice especially.

The preparation approach of a sample: The carbonization shell calcium carbonate was mixed with soil as follows.

Sample a: 2g of red-clay (flat ground) + carbonization shell calcium carbonates

Sample b: 200g of 2g + fermentation chicken droppings of red-clay (flat ground) + carbonization shell calcium carbonates

Sample c: 200g of 2g + fermentation chicken droppings of red-clay (*****+) + carbonization shell calcium carbonates

Sample d: black soil (field) -- 200g of 2g + fermentation chicken droppings of + carbonization shell calcium carbonates

The container for a trial: Mini-planter 0.13mx0.26mx0.10m (volume 0.0338m³)

Red-clay extraction ground: Aomori new Shirochi division

black soil -- extraction ground: -- the Ariura, Odate-shi, Akita-ken area

Trial location: Sample a is indoor. Samples b, c, and d are the outdoors.

Existence of effusion: Sample a has no effusion. Samples b, c, and d are those with effusion.

Measuring equipment: PH meter WM-22EP (****DDK.KK)

[0060]

A test result is shown in Table 2.

[0061]

[Table 2]

[0062]

As shown in a table, prompt and sufficient soil amelioration to which each experimental plot soil of pH 5.4-6.0 will reach pH 6.4-6.8 at the next day of the 2nd day of mixing, i.e., carbonization shell calcium-carbonate mixing, was made, and the level was mostly maintained after that before the 115th. That is, also in which experimental plot, it was shown that the carbonization shell calcium carbonate of this invention has the quick-acting acid soil amelioration effectiveness.

[0063]

< Example 4 ashing -- soil amelioration performance test [of a soil conditioner with a processing shell] >

ashing -- the acid soil amelioration effectiveness of a soil conditioner (the following -- "ashing -- it is called shell calcium-carbonate".) with a processing shell was examined. The experimental specification is as follows.

preparation approach [of a sample]: -- the following passage -- soil and ashing -- the shell calcium carbonate was mixed.

Sample a: red-clay (flat ground) + -- ashing -- 200g of 2g + fermentation chicken droppings of shell calcium carbonates

Sample b: red-clay (******) + -- ashing -- 200g of 2g + fermentation chicken droppings of shell calcium carbonates

sample c: black soil (field) + -- ashing -- 200g of 2g + fermentation chicken droppings of shell calcium carbonates

The container for a trial: Mini-planter 0.13mx0.26mx0.10m (volume 0.0338m³)

Red-clay extraction ground: Aomori new Shirochi division

black soil -- extraction ground: -- the Ariura, Odate-shi, Akita-ken area

Trial location: Samples a, b, and c are the outdoors.

Existence of effusion: Samples a, b, and c are those with effusion.

Measuring equipment: PH meter WM-22EP (****DDK.KK)

[0064]

A test result is shown in Table 3.

[0065]

[Table 3]

[0066]

As shown in a table, it is pH 6.0-6.1 (the data of front Naka are rounded off and it expresses with the numeric value to the decimal point primacy.). the following -- the same. prompt and sufficient soil amelioration to which each experimental plot soil will reach pH 6.8-7.7 at the next day of the 2nd day of mixing, i.e., carbonization shell calcium-carbonate mixing, should do -- it was the inclination which the level is mostly maintained by Sample a, and is increased gradually by Samples b and c henceforth before the 55th. namely, which experimental plot -- also setting -- ashing of this invention -- it was shown that a shell calcium carbonate has the quick-acting acid soil amelioration effectiveness.

[0067]

< Example 5 Cultivation experiment (1) > by the carbonization shell calcium carbonate
Soil spraying of a carbonization shell calcium carbonate examined about the effect
which it has on agricultural-products cultivation. The experimental specification is as
follows.

[0068]

The worksheet and growth record concerning an exam are shown in Table 4. In
addition, "mineral lime" is a shell calcium carbonate concerning this invention among a
table.

[0069]

[Table 4]

[0070]

Although seeding of a spinach was performed at that day which mixed the carbonization
shell calcium carbonate in soil as shown in the table, there is especially no trouble in
growth of a subsequent spinach, and the favorable growth more than the usual
cultivation conditions and an EQC was shown. From the exam result, while quick-acting
acid soil amelioration was possible for the shell calcium carbonate concerning the soil
conditioner of this invention, the effectiveness which the failure on cultivation of hurting
one's root of the vegetation to grow does not produce at all was indicated to be
vegetable ***** on the day which carried out spraying administration of this.

[0071]

< Example 6 Cultivation experiment (2) > by the carbonization shell calcium carbonate
Soil spraying of a carbonization shell calcium carbonate examined about the effect
which it has on agricultural-products cultivation. The experimental specification is as
follows.

[0072]

The worksheet and growth record concerning an exam are shown in Table 5. In
addition, "mineral lime" is a shell calcium carbonate concerning this invention among a
table.

[0073]

[Table 5]

[0074]

Although seeding of Chinese cabbage was performed at that day which mixed the
carbonization shell calcium carbonate in soil as shown in the table, there is especially
no trouble in growth of subsequent Chinese cabbage, and the favorable growth superior
to the usual cultivation conditions was shown. While quick-acting acid soil amelioration
was possible for the shell calcium carbonate applied to the soil conditioner of this
invention from an exam result, the effectiveness which the failure on cultivation of
hurting one's root of the vegetation to grow does not produce at all was shown, and also
having the effectiveness which promotes vegetable growth and growth further was

suggested, saying vegetable ***** on the day which carried out spraying administration of this.

[0075]

< Example 7 Cultivation experiment (3) > by the carbonization shell calcium carbonate Soil spraying of a carbonization shell calcium carbonate examined about the effect which it has on agricultural-products cultivation. The experimental specification is as follows.

[0076]

Drawing 4 is the photograph Fig. showing the growth situation in the final day of a trial of the Chinese cabbage grown in the soil which mixed the carbonization shell calcium carbonate.

Drawing 5 is the photograph Fig. showing the growth situation in the final day of a trial of the Chinese cabbage grown in the comparison soil which does not mix a carbonization shell calcium carbonate.

[0077]

The effectiveness which the failure on cultivation of hurting one's root of the vegetation to grow does not produce at all was shown again, and it was further indicated to be vegetable ***** on the day to which the shell calcium carbonate applied to the soil conditioner of this invention from drawing 4 and the exam result shown in 5 carried out spraying administration of this to also have the effectiveness which promotes vegetable growth and growth, such as height of grass and magnitude of a leaf.

[0078]

< example 8 Cultivation experiment (4) > by the shell calcium carbonate In addition, in each following agricultural-products cultivation experiment, when the shell calcium carbonate which is this invention soil amelioration material is sprinkled as former ** and seeding is carried out on the same day, there being no bad influence in a cultivation top plant body in any way, and growing favorably is checked. () An inner display is the effectiveness on the cultivation which should be mentioned especially.

[0079]

- (I) Leaf vegetable Chinese cabbage (increment in a yield), ***** (growth is good.) Delicious..
- (II) Legumes and cereals soybean (growth is good.) Tightness of a fruit is good. Delicious. It offers (increment in a yield) and they are Shozu (increment in a yield), and corn (tightness of a fruit is good.).
- (III) Potato potato (sprout fitness.) Growth is good. Increment in a yield. Konnyaku (increment in a yield).
- (IV) Root vegetables Japanese radish (growth is good.)
- (V) Stalk-crops chive (sprout fitness.) Delicious. Shallots (growth is good.).
- (VI) Crest grape (it is used as an additional fertilizer.) Growth is good.

[0080]

< Example 9 Baking trial [of shells other than a scallop] >

On the same conditions as examples 1 and 2, the baking trial of shells other than a scallop was performed. The examined shellfishes are an oyster and a freshwater clam. A result is shown in Tables 6 and 7. although there was a difference of friability according to the class of shellfish as a table -- any -- carbonization of this invention, and ashing -- the predetermined baking processing object by processing conditions was obtained, and it was shown that the manufacture approach of this invention is applicable also to shellfishes other than a scallop.

[0081]

[Table 6]

[0082]

[Table 7]

[0083]

[Effect of the Invention]

Since the marine-resources use soil conditioner and its manufacture approach of this invention are constituted as mentioned above, they can perform quick-acting acid soil amelioration by the calcium carbonate. And since there is no failure to the root of a plant body etc., even from sprinkled that day, seeding is possible and the field number of workable days especially in a cold district can be expanded greatly.

[0084]

Furthermore, according to the marine-resources use soil conditioner of this invention, vegetable growth is promoted and the effectiveness of raising quality is also acquired.

[Brief Description of the Drawings]

[Drawing 1] It is the flow Fig. showing the configuration of the manufacture approach of the marine-resources use soil conditioner concerning this invention.

[Drawing 2] It is the manufacture approach of the marine-resources use soil conditioner concerning this invention, and is the flow Fig. showing a configuration including a carbonization process.

[Drawing 3] It is the manufacture approach of the marine-resources use soil conditioner concerning this invention, and is the flow Fig. showing the configuration containing an ashes chemically-modified degree.

[Drawing 4] It is the photograph Fig. showing the growth situation in the final day of a trial of the Chinese cabbage grown in the soil which mixed the carbonization shell calcium carbonate.

[Drawing 5] It is the photograph Fig. showing the growth situation in the final day of a trial of the Chinese cabbage grown in the comparison soil which does not mix a

carbonization shell calcium carbonate.

[Description of Notations]

1 -- marine resources (raw material) 2 -- baking processing object (organic substrate deterioration) 3, 33, and 63 -- soil conditioner 32 -- baking processing object (organic substrate carbonization) 62 -- baking processing object (an organic substrate ashing) P1 -- baking down stream processing P2, P32, and P62 -- disintegration down stream processing P31 -- carbonization down stream processing P61 -- ashing -- down stream processing

CLAIMS

[Claim 1]

Baking down stream processing calcinated on the baking conditions which bring deterioration of an organic substrate to extent which enables separation from the organic substrate of a calcium carbonate for the marine resources which contain a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent, By passing through disintegration down stream processing for separating the calcium carbonate in the baking processing object obtained by this baking down stream processing The manufacture approach of a marine-resources use soil conditioner that the marine-resources use soil

conditioner which exists where a calcium carbonate is separated from an organic substrate can be obtained.

[Claim 2]

The manufacture approach of a marine-resources use soil conditioner according to claim 1 that said marine resources are characterized by being the shell of shellfish, such as a scallop, an oyster, and a freshwater clam.

[Claim 3]

The manufacture approach of the marine-resources use soil conditioner according to claim 1 or 2 which said baking down stream processing is performed on the baking conditions which can carbonize said organic substrate, and is characterized by the ability to obtain the baking processing object which considers non-decomposed a calcium carbonate and the carbonized organic substrate as a presentation according to this process.

[Claim 4]

The manufacture approach of a marine-resources use soil conditioner according to claim 3 that said baking conditions come out 25 or less minutes 3 minutes or more, and are characterized by a certain thing the burning temperature of 740 degrees C or less of 560 degrees C or more, and firing time.

[Claim 5]

The manufacture approach of a marine-resources use soil conditioner according to claim 3 that said baking conditions come out 20 or less minutes 5 minutes or more, and are characterized by a certain thing the burning temperature of 700 degrees C or less of 600 degrees C or more, and firing time.

[Claim 6]

The manufacture approach of the marine-resources use soil conditioner according to claim 1 or 2 which said baking down stream processing is performed on the baking conditions which can ash said organic substrate, and is characterized by the ability to obtain the baking processing object which considers non-decomposed a calcium carbonate and the ashed organic substrate as a presentation according to this process.

[Claim 7]

The manufacture approach of a marine-resources use soil conditioner according to claim 6 that said baking conditions come out 45 or less minutes 25 minutes or more, and are characterized by a certain thing the burning temperature of 900 degrees C or less of 720 degrees C or more, and firing time.

[Claim 8]

The manufacture approach of a marine-resources use soil conditioner according to claim 6 that said baking conditions come out 45 or less minutes 25 minutes or

more, and are characterized by a certain thing the burning temperature of 850 degrees C or less of 750 degrees C or more, and firing time.

[Claim 9]

The manufacture approach of a marine-resources use soil conditioner according to claim 6 that said baking conditions come out 45 or less minutes 25 minutes or more, and are characterized by a certain thing the burning temperature of 830 degrees C or less of 770 degrees C or more, and firing time.

[Claim 10]

The manufacture approach of the marine-resources use soil conditioner according to claim 6 to 9 characterized by being a thing using the fuel and firing furnace with which said baking conditions can disassemble the calcium oxide generated in said baking down stream processing.

[Claim 11]

The manufacture approach of the marine-resources use soil conditioner according to claim 10 characterized by for said fuel being natural gas and said firing furnace being a radiant heat mold firing furnace.

[Claim 12]

Said disintegration down stream processing is the manufacture approach of the marine-resources use soil conditioner according to claim 1 to 11 characterized by being the process which carries out crushing processing of said baking processing object mechanically, and lets the wire sieve of 60 meshes (250 micrometers) thru/or 80 meshes (177 micrometers) pass for the obtained crushing processing object.

[Claim 13]

The marine-resources use soil conditioner characterized by for the calcium-carbonate content obtained by using as a raw material the shell of shellfish, such as the scallop and oyster which contain a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent, and a freshwater clam, and carrying out baking processing of this being 98% of the weight or more, and alkalinity being 60% or less 50% or more.

[Claim 14]

The marine-resources use soil conditioner which is obtained using the manufacture approach according to claim 2 to 12, and is characterized by for a calcium-carbonate content being 98% or more, and alkalinity being 60% or less 50% or more.

[Claim 15]

The marine-resources use soil conditioner which is a marine-resources use soil conditioner which contains a calcium carbonate and the organic substrate which wraps this in and exists as main quality of a constituent, and which is obtained by using the shell of shellfish, such as a scallop, an oyster, and a freshwater clam, as a raw material, and carrying out baking processing of this, and is characterized by a particle with a

particle size of 250 micrometers or less occupying 100 or less% of the weight of the whole 90% of the weight or more.

[Claim 16]

The marine-resources use soil conditioner which is obtained using the manufacture approach according to claim 2 to 12, and is characterized by a particle with a particle size of 250 micrometers or less occupying 100 or less% of the weight of the whole 90% of the weight or more.